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Experiment: 7. Implement a program to demonstrate the working of LR(0).
Class: TY CSE A, 31

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#include <iostream>
#include <cstring>  // For strlen()
#include <cstdio>   // For printf()

using namespace std;

int axn[][6][2] = {
   {{100, 5}, {-1, -1}, {-1, -1}, {100, 4}, {-1, -1},
{-1, -1}},
   {{-1, -1}, {100, 6}, {-1, -1}, {-1, -1}, {-1, -1},
{102, 102}},
   {{-1, -1}, {101, 2}, {100, 7}, {-1, -1}, {101, 2},
{101, 2}},
   {{-1, -1}, {101, 4}, {101, 4}, {-1, -1}, {101, 4},
{101, 4}},
   {{100, 5}, {-1, -1}, {-1, -1}, {100, 4}, {-1, -1},
{-1, -1}},
   {{100, 5}, {101, 6}, {101, 6}, {-1, -1}, {101, 6},
{101, 6}},
   {{100, 5}, {-1, -1}, {-1, -1}, {-1, -1}, {-1, -1}, {-
1, -1}},
   {{100, 5}, {-1, -1}, {-1, -1}, {100, 4}, {-1, -1},
{-1, -1}},
   {{-1, -1}, {100, 6}, {-1, -1}, {-1, -1}, {100, 11},
{-1, -1}},
   {{-1, -1}, {101, 1}, {100, 7}, {-1, -1}, {101, 1},
{101, 1}},
   {{-1, -1}, {101, 3}, {101, 3}, {-1, -1}, {101, 3},
{101, 3}},
   {{-1, -1}, {101, 5}, {101, 5}, {-1, -1}, {101, 5},
{101, 5}}
};

int gotot[12][3] = {
   {1, 2, 3}, {-1, -1, -1}, {-1, -1, -1}, {-1, -1, -1},
   {8, 2, 3}, {-1, -1, -1}, {-1, 9, 3}, {-1, 10, -1},
   {-1, -1, -1}, {-1, -1, -1}, {-1, -1, -1}, {-1, -1, -1}
};

int a[10];
char b[10];
int top = -1, btop = -1, i;

void push(int k) {
   if (top < 9)
      a[++top] = k;
}

void pushb(char k) {
   if (btop < 9)
      b[++btop] = k;
}

char TOS() {
   return a[top];
}

void pop() {
   if (top >= 0)
      top--;
}

void popb() {
   if (btop >= 0)
      b[btop--] = '\0';
}

void display() {
   for (i = 0; i <= top; i++)
      cout << a[i] << b[i];
}

void display1(char p[], int m) {
   cout << "\t\t";
   for (int l = m; p[l] != '\0'; l++)
      cout << p[l];
   cout << endl;
}

void error() {
   cout << "\n\nSyntax Error" << endl;
}

void reduce(int p) {
   int k, ad;
   char src;
   const char* dest;

   switch (p) {
      case 1: dest = "E+T"; src = 'E'; break;
      case 2: dest = "T"; src = 'E'; break;
      case 3: dest = "T*F"; src = 'T'; break;
      case 4: dest = "F"; src = 'T'; break;
      case 5: dest = "(E)"; src = 'F'; break;
      case 6: dest = "i"; src = 'F'; break;
      default: dest = "\0"; src = '\0'; break;
   }

   for (k = 0; k < strlen(dest); k++) {
      pop();
      popb();
```

```
    }

    pushb(src);

    switch (src) {
        case 'E': ad = 0; break;
        case 'T': ad = 1; break;
        case 'F': ad = 2; break;
        default: ad = -1; break;
    }

    push(gotot[TOS()][ad]);
}

int main() {
    int j, st, ic;
    char ip[20], an;

    cout << "Enter any String: ";
    cin.getline(ip, 20);  // Safe alternative to gets()

    push(0);
    display();
    cout << "\t" << ip << endl;

    for (j = 0; ip[j] != '\0';) {
        st = TOS();
        an = ip[j];

        if (an >= 'a' && an <= 'z')
            ic = 0;
        else if (an == '+')
            ic = 1;
        else if (an == '*')
            ic = 2;
        else if (an == '(')
            ic = 3;
        else if (an == ')')
            ic = 4;
        else if (an == '$')
            ic = 5;
        else {
            error();
            break;
        }

        if (axn[st][ic][0] == 100) {
            pushb(an);
            push(axn[st][ic][1]);
            display();
            j++;
            display1(ip, j);
        }

        if (axn[st][ic][0] == 101) {
            reduce(axn[st][ic][1]);
            display();
            display1(ip, j);
        }

        if (axn[st][ic][1] == 102) {
            cout << "Given String is Accepted" << endl;
            break;
        }
    }

    cout << "Press Enter to exit...";
    cin.get();  // Safe alternative to getch()

    return 0;
}
```

```
Enter any String: a+b*c
0   a+b*c
0a5   +b*c
0F3   +b*c
0T2   +b*c
0E1   +b*c
0E1+6   b*c
0E1+6b5   *c
0E1+6F3   *c
0E1+6T9   *c
0E1+6T9*7   c
0E1+6T9*7c5
Press Enter to exit...
```